

Significant Facilities in NVN
1970

No Date Aerial Attack of the Levee System in the Hanoi Area
 of North Vietnam (A Study Prepared by J-3, Joint
 Staff in Collaboration with DIA)

6 May 70 Typescript IM, Significant Physical Facilities in
 North Vietnam, 6 May 70

25X1 6 May 70 [] to DD/OER Blue Note re update of targets in 25X1
 North Vietnam and asking if electric power plants are
 of higher priority than some key storage areas []
 response included)

8 May 70 Unsigned informal letter to DD/OER re reaction to
 re-reading of IM of 29 September (Significant Physical
 Facilities in North Vietnam, 29 September 1969)

JCS review completed.

DIA review(s)
completed.

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8 May 1970

Paul,

On re-reading the IM of 29 September, I found that I had a different reaction to some parts of it.

In the total piece there were appropriate statements that made it clear that N.V. offered a poor target system. However, I felt that some of the individual sections, electric power, and the Hanoi Machine Tool Plants in particular, were playing up the importance of some of these targets more than can be justified.

The "impact can be maximized if strikes are carried out ...simultaneously." Certainly true, but so what. What is there really to maximize. The slow rate of repair to these punk installations shows that they are not terribly important.

I don't see how the destruction of the Hanoi Machine Tool Plant would have a deep psychological impact on Hanoi's leadership. Compared to imports of machinery the output of this plant is peanuts. The North Vietnamese have already lost tens of thousands of troops without affecting their resolve. I can't see how the destruction of this plant would have a measurable impact on the leadership.

In short, despite the qualifications, I still feel there are elements of the air force position that air power alone can bring the enemy to his knees. I think this is found in the last sentence of the introduction despite qualification of "might." I also feel there are very few targets in North Vietnam that if destroyed would have a "strong psychological" impact on Hanoi's leadership. This is one of our criteria listed in para. 5. for target selection. I feel that very few of our targets actually meet this criteria.

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MEMORANDUM FOR: DD/OER

Here is an update of targets in North Vietnam. I want to take another look at it to see if I still agree with the order of priorities. Are the electric power plants of higher priority than some of the key storage areas?

Depends on purpose + justification
+ int'l environment
- EP - if aim to stagger Hanoi
- supply - if aim related to war in South + we want
more acceptable justification for international audiences.

1970

6 May 1970

(DATE)

FORM NO. 101 REPLACES FORM 10-101
1 AUG 54 WHICH MAY BE USED.

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Date

AERIAL ATTACK
OF
THE LEVEE SYSTEM IN THE HANOI AREA OF NORTH VIETNAM

A Study Prepared by J-3, Joint Staff
in Collaboration with DIA

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I

STUDY SUMMARY

1. The dependence of North Vietnam agriculture on flood control provided by the levee system in the Hanoi area suggests consideration of the levee system as a possible target for aerial attack.
2. The flat delta plain of the Red River area of North Vietnam is heavily populated and intensely cultivated, with most of the 6,000 square miles of the delta plain covered by rice paddies. Practically the entire area would be subjected to an annual flooding were it not for the extensive system of levees constructed to contain the rivers, streams and channels in and contiguous to the area. The water surface elevation in the Hanoi delta plain reflects seasonal variations, with a summer maximum generally occurring during the July/August period, and a winter minimum in the February/March period. This study is addressed to the feasibility of timely breaching of the Red River primary levee system by aerial bombing to induce flooding of Hanoi and its environs.
3. The levee system has virtually eliminated flooding by natural causes, but induced breaching of the levee system can be effected by aerial attack. The extent to which resultant flooding would achieve maximum disruption in the Hanoi delta plain would be contingent on (1) the existence of a high Red River flood stage level at Hanoi, and (2) the accuracy, timing and effectiveness of aerial attack breaching efforts.
4. The effect of successful breaching operations during a period of high Red River flood stage in the Hanoi area might result in temporarily diverting an indeterminate portion of Hanoi's effort in support of aggression in South Vietnam through the increased expenditure of North Vietnam national effort required to cope with flood conditions in the Hanoi area. In addition, a portion of the semi-annual rice crop would be destroyed. It is believed,

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however, that the primary effect would be increased hardship to the peasant who tills the rice paddies, and vast portions of other civilians that populate the delta plains. Successful aerial attacks would create conditions inconsistent with both the announced and implied US policy of limiting objectives to those that support communist aggression in South Vietnam.

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II

AERIAL ATTACK OF THE LEVEE SYSTEM IN THE HANOI
AREA OF NORTH VIETNAM

1. General Descriptiona. Importance:

The flat delta plain of the Red River is densely populated and intensely cultivated, with most of the 6,000 square miles in the plain covered by rice paddies. Practically the entire area would be flooded annually if it were not for an extensive water control system of levees constructed to contain the rivers, streams, and channels. The water control structures enable North Vietnam to produce two rice crops a year above 19° N. In addition, the water control structures enable "normal/dry" operation of 14 JCS numbered targets and 12 additional militarily significant targets.

b. Levee System

From the Hanoi area, the delta area fans southeastward to the Gulf of Tonkin, sloping gradually from an elevation of about 8 meters above sea level near Hanoi to less than one meter near the coast. In the central part of the delta plain, the most significant terrain feature is the "natural" levees of alluvial deposits along the banks of the waterways. Near Hanoi these rise to 3.3 meters above the surrounding terrain; further downstream, they decrease to about one meter. They are one to two miles wide and slope gradually from a crest near the stream. These natural levees divide the delta into a series of shallow, saucer-shaped basins, or compartments, (Enclosure A), in which water tends to pond and drainage is difficult. The Hanoi urban complex is bounded on the north by the Red River and its Song Duong (Canal-des-Rapides) distributary, to the west by Song-Day, to the east by Song Thai Binh. The westward area is designated as Compartment A and the eastward area as Compartment B. Southward of its

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junction with the Song Duong, the Red River divides Hanoi into eastern and western sections; with the central city proper lying on the west bank. At Hanoi, the Red River main levees rise to an elevation of about 13.5 meters above mean sea level, or about 12 meters above the river bed. The height of the levees above flood stage is about 1.5 meters. Widths of the levees range from 7-9 meters at the top to 45 meters at the base (Enclosure B).

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TOP SECRET2. Vulnerability to Aerial Attack

a. Water control realized through the levee system has practically eliminated flooding by natural causes, but induced flooding achieved by breaching the levee system by means of aerial attack in selected locations is considered feasible. The extent to which flooding operations would achieve maximum disruption is contingent on (1) the existence of a favorable Red River flood stage level at Hanoi, and (2) the timing, accuracy, and effectiveness of aerial attack breaching operations.

(1) To achieve maximum effectiveness, the optimum water level for commencement of aerial attack breaching operations would be when the river stage level approaches the top of the levees, approximately 13.5 meters above mean sea level at Hanoi; but only during infrequent major floods does the stage exceed 11 meters. Considering the probabilities of occurrence, the realistically acceptable breaching stage will be assumed to be the 10 meter level (Enclosure C).

(2) During likely flood periods, aerial reconnaissance and collection of river stage data will assist in determining the most propitious time to commence aerial attack breaching operations.

b. Damage objectives of the aerial attacks on the levees would be to crater across the entire crown of the levees at a depth sufficient to ensure that crater lips would be below the water level of the river channel. Proper cratering would induce a scouring action of water rushing through the breach and rapidly deepen the breach to the base of the levee. The breach would also widen to an appreciable width. Levees to be breached should be located as close as possible to the specific areas selected for flooding.

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c. Four breach points have been selected as suitable locations to effect the probable maximum flooding effect; three breach points for Compartment A and one breach point for Compartment B (Enclosure D). Simultaneous breaching at indicated points in Compartment A would result in rapid flooding with relatively swift current velocities and consequent maximum damage. A single breach accomplished under optimum flood stage levels in Compartment A or B would have immediate and disruptive effect in the general area of the breach, but would be substantially decreased as distance from the breach increased. Breaching at multiple points would result in more rapid rise of water level throughout the compartments thereby maximizing damages, minimizing opportunity for dispersal or salvage operations, and neutralizing the effectiveness of defensive breaching.

3. Weapons Requirement

a. Breaching of the levees can be accomplished by cratering the crest of the levee far enough below the water level so that there is sufficient head and volume of water to continuously deepen and widen the breach by erosion.

(1) Waterline thickness of the levee at the 10 meter flood stage is approximately 80 feet. Neither a single 1000 lb. GP nor a single 2000 lb. GP is capable of cratering the thickness of the levee at the waterline. The problem is to obtain a sufficient number of closely spaced hits so that overlapping craters will cut a channel completely through the levee below the water level.

b. The 1000 lb. GP dropped from 4000 feet altitude at 350 MPH will penetrate approximately 10.1 feet in average soil and produce a crater approximately 37 feet in diameter.

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intervalometer*

Assuming that 11 bombs are dropped in train with an intervalometer setting to achieve a 30 foot spacing between bomb impacts, and a CEP for the center of the train equal to 200 feet, the following table shows weapon requirements for three assurance levels of cutting the levee at the 10 meter stage.

(1) 10 Meter Flood Stage

<u>Assurance</u>	<u>No. of Trains</u>	<u>No. of 1000 lb GP Bombs</u>
50%	5	55
70%	6	66
85%	8	88

The 2000 lb GP would produce a crater about 48 feet in diameter and would be the best available GP bomb for an attack in which the bombs would be individually aimed or dropped. It is estimated that it would be necessary to concentrate five hits with 2000 lb GP bombs in an area 50 feet wide across the crest of the levee in order to ensure a complete cut at the water line. The following table shows the weapon requirements in terms of probability of 3, 4, or 5 hits in the 50 by 80 foot vulnerability area, assuming a CEP of 200 feet.

(2) 10 Meter Flood Stage

Weapon Requirements (No. of 2000 lb. GP Bombs)

<u>Probability</u>	<u>3 Hits</u>	<u>4 Hits</u>	<u>5 Hits</u>
.50	125	170	240
.70	170	220	300
.85	230	290	360

It is to be noted that if three hits in the vulnerable area would cut the necessary channel, the weapon requirements would be considerably greater than those estimated for train bombing illustrated above.

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TOP SECRET4. Effect of Aerial Attack

a. Induced flooding accomplished by aerial attack is feasible. The maximum effect of flooding would require successful breaching of levees timed to coincide with optimum river stage levels which are most likely to occur during the mid-June through mid-August period. Breaching of levees would require heavy bomb loads, high total ordnance expenditure, and accurate delivery.

b. Approximately 26 military and key industrial installations would be subject to inundation and flood damage (Enclosure E). Duration of inundation, extent of damage and recuperability would depend upon such factors as the height of flooded waters at the time of breaching, elevation of the target, and the nature of the target.

c. Flooding during the Red River flood stage time period, i.e., mid-June through mid-August, would drown the freshly transplanted rice crop and possibly produce significant economic pressures upon the DRV urban population. It is to be noted, however, that two rice crops a year are grown north of 19° N; hence only one rice crop would be affected in view of the limited period of time, to wit, mid-summer, when optimum conditions for breaching operations would occur.

d. Compartment A embraces an area with a population of 979,000, and the area designated as Compartment B has a population of 220,000. Maximum North Vietnam casualties resulting from successful optimum breaching of Compartments A and B at the 10 meter level is anticipated to be approximately 200 to 300. Bombing of the levees would account for 100 to 200, and the resultant flooding would account for the remaining casualties.

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2 - 3
1 - 2
1 - 1

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The modest number of estimated casualties can be attributed to the fact that flooding of the area from natural causes is not uncommon, and positive steps have been taken to limit flood damage. For example, houses in many cases are built on stilts and the foundations of larger buildings are constructed to withstand high water.

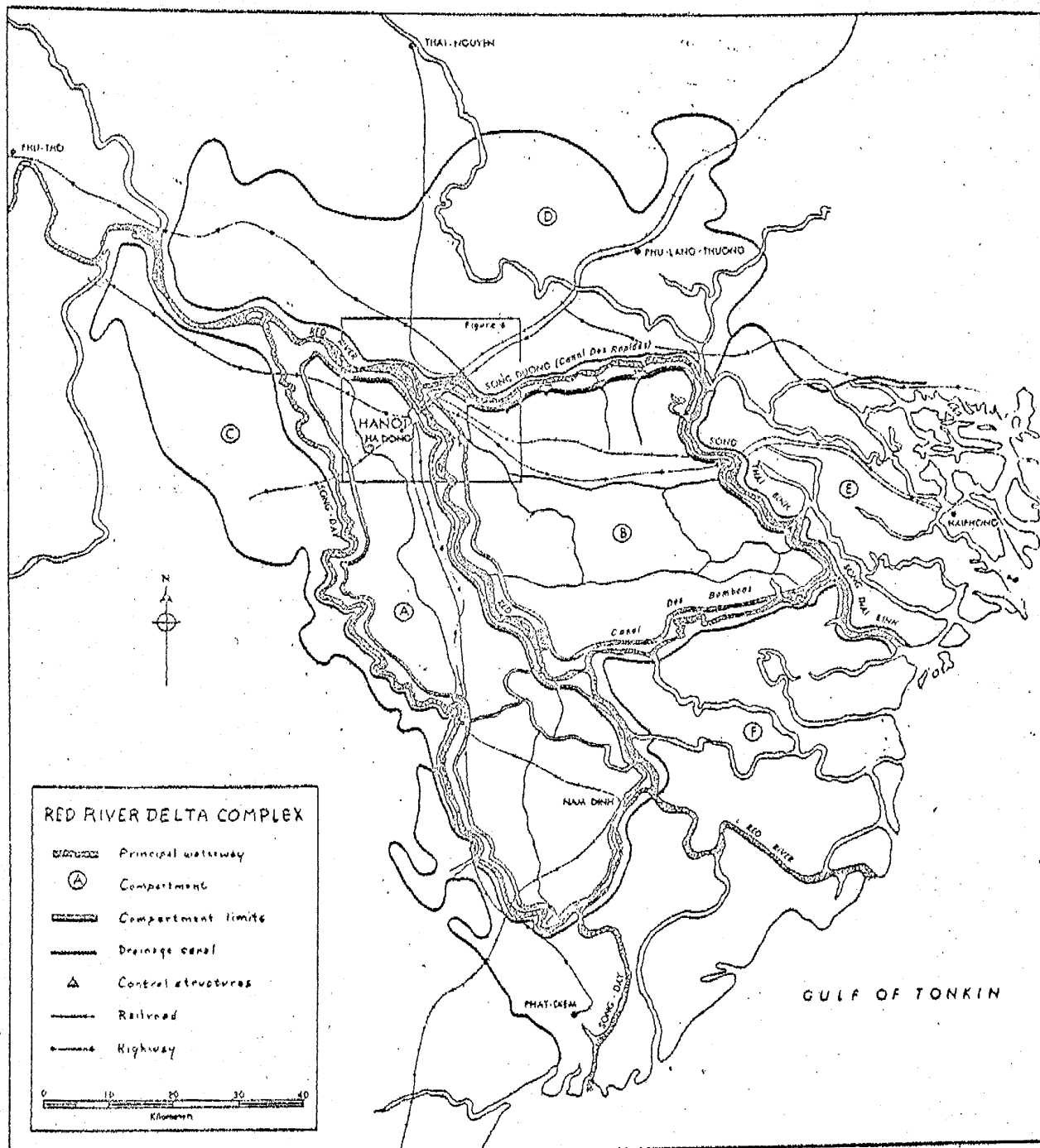
e. Aerial attack on the levee system in the Hanoi area would not seriously affect a significant segment of the populace of North Vietnam for a meaningful period of time. Successful breaching of the levees at selected points would result in damage and inconvenience principally in the agricultural areas. The peasant would be the real victim. Further, flooding of the area would not seriously disrupt lines of communications as routes are principally located on top of the levees. Finally, world opinion would probably be opposed to the destruction of the basic food commodity of rice, as shortages created would result in hardship to the civilian populace.

f. It is therefore concluded that aerial attacks with conventional weapons on the levee system in the Hanoi area would have doubtful military effect and are not considered appropriate at the present time.

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ENCLOSURE A

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FIGURE 1

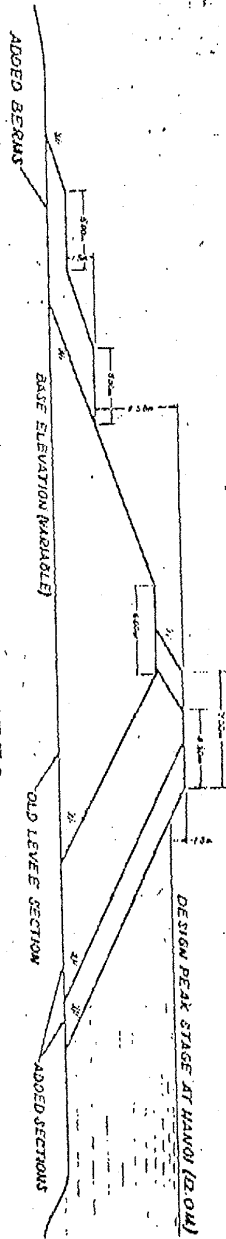
Enclosure 4

TYPICAL LEVEE CROSS-SECTIONS

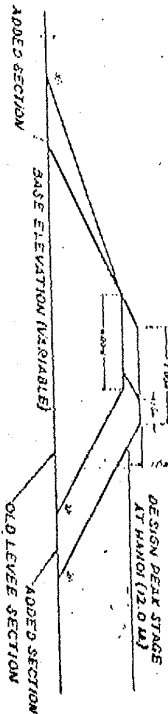
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ENCLOSURE B

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PRIMARY LEVEES



SECONDARY LEVEES

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FIGURE 3

Enclosure B

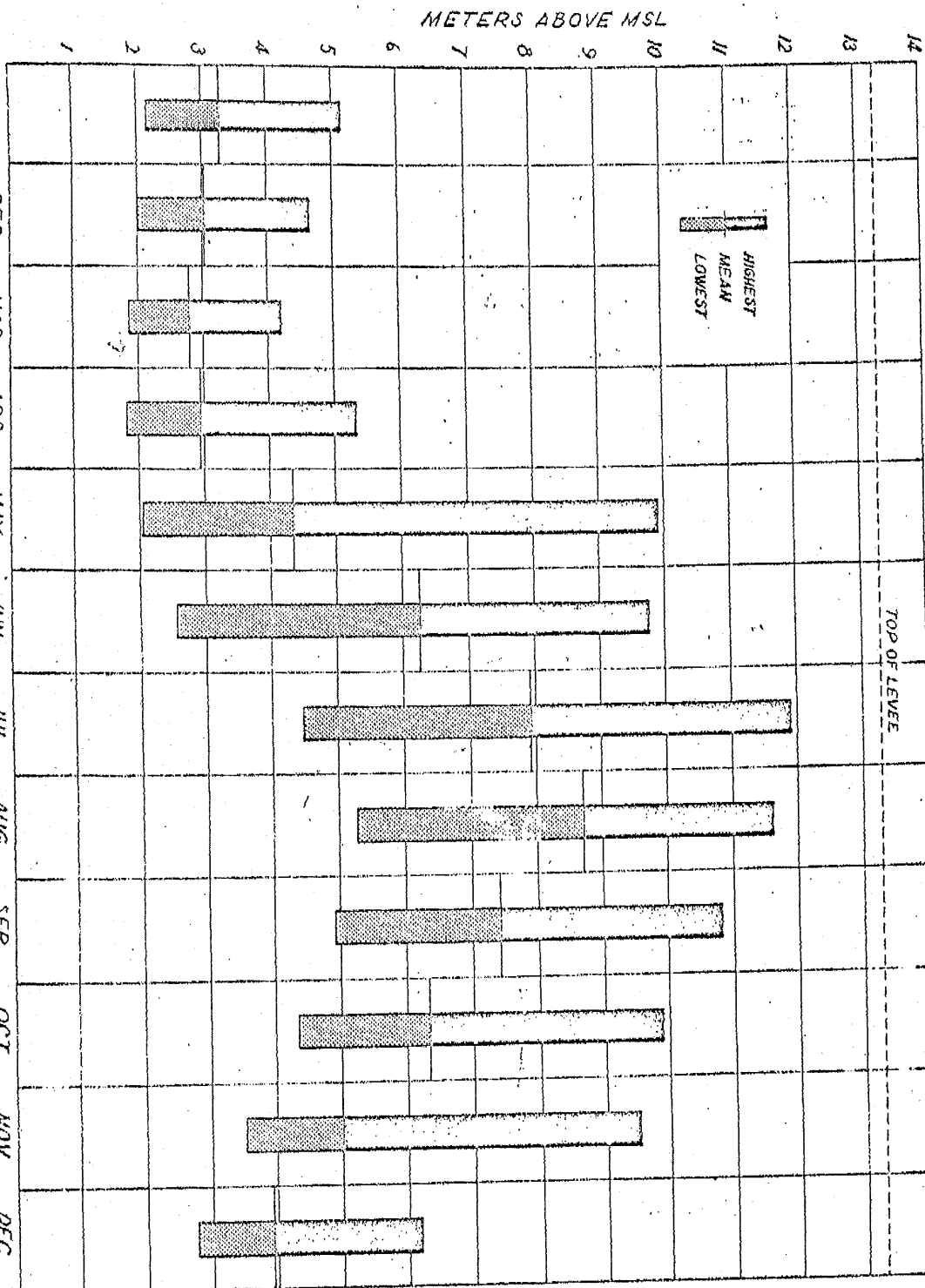
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RED RIVER AT HANOI

ENCLOSURE C

MONTHLY MEAN AND EXTREME RIVER STAGES

PERIOD: 1907-1930



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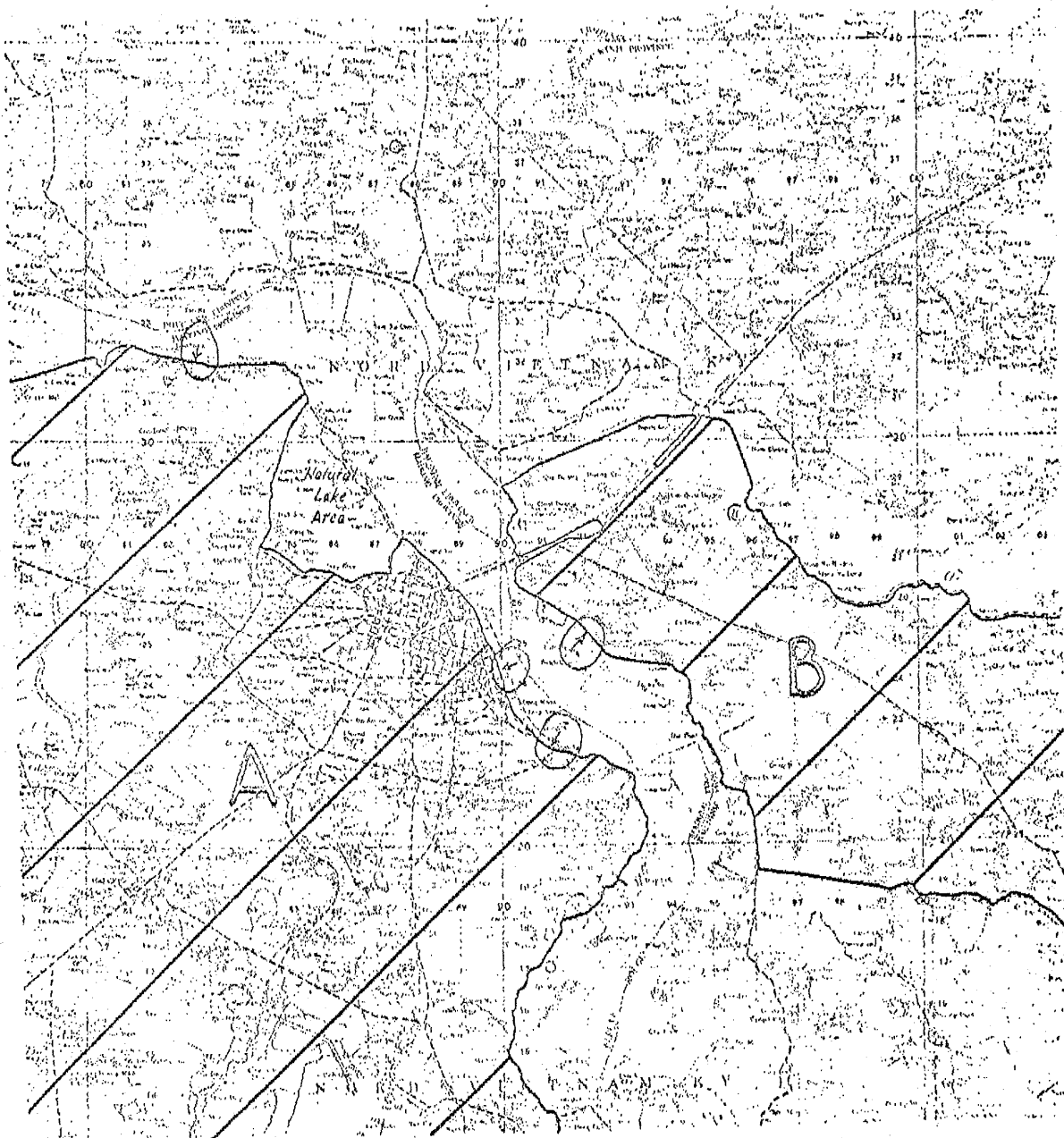
ENCLOSURE D

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HANOI

AREAS FLOODABLE BY LEVEL BREACHES



FLOODABLE
AREAS

→ BREACHING
POINTS

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10 METER STAGE

10

Enclosure D

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ENCLOSURE E

INUNDATED TARGETS - HANOI AREA

JCS Numbered TargetsJCS
TARGET
NO.BE NUMBERINSTALLATION

25X5

616-8408	Hanoi/Gia Lam Airfield
616-8407	Hanoi/Bac Mai Airfield
616-0031	Hanoi Railroad Yard
616-0150	Ha Dong Army Bks & Supply Depot
616-0116	Hanoi POL Storage Thanh Am
616-0247	Hanoi POL Storage Bac Mai
616-0063	Hanoi MND/Army & MZ Hqs/Bks & Supply Depot
616-0271	Hanoi Army Bks S Quinh Loi
616-0300	Hanoi Army Supply Depot N Tay Ho
616-0259	Van Dien Army Supply Depot
616-0164	Hanoi Internatl Radio Transmitting Station, Dai Mo
616-0014	Hanoi Port Facilities
616-0261	Hanoi Engineering and Machine Tool Plant
616-0016	Hanoi Thermal Power Plant

*Insert A*JCS Unnumbered Targets

616-0258	Hanoi Army Bks NNW, Thuy Phuong
616-0252	Hanoi Army Bks W, Mai Dich
616-0163	Hanoi Radio Broadcasting Station, Me Tri
616-0174	Ha Dong Government Control Center
616-0294	Hanoi Army Bks W, Tay Ho
616-0092	Hanoi Army Bks Central W
616-0087	Hanoi Government Control Center
616-0357	Hanoi Army Bks & Officer School Bac Mai Airfield
616-0257	Hanoi Army Bks NE Gia Thuong

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BE NUMBER

INSTALLATION

616-0262	Hanoi Warehouse Area Gia Thuong
616-0038	Hanoi Storage Depot Co B1
616-0243	Ha Dong Hwy Br over Song Nhue Giang

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Enclosure E